Original document

ROLLER FOR COMPRESSOR

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US4904302

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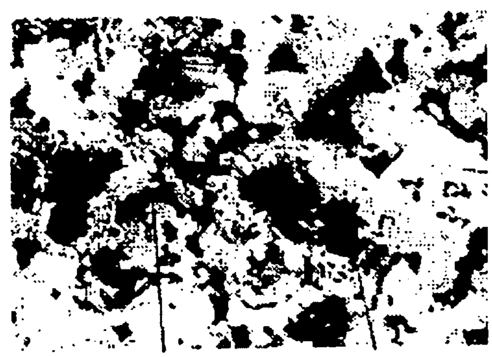
Abstract of **JP1134092**

PURPOSE:To prevent wear and scuffing from occurring by forming a roller from a sintered alloy, consisting of a specified quality composition, dispersing Fe-Mo alloyed hard grains in a pearlite or tempered martensite ground, and whose sintered holes are sealed by triiron tetroxide.
CONSTITUTION:A compressor roller is composed of a sintered alloy whose quality composition consists of C: 0.5-2.0, Cu: 1.0-5.0, Mo: 1.2-3.0, the rest of Fe and impurities in terms of wt.%, and Fe-Mo alloyed hard grains are dispersed in a pearlite or tempered martensite ground and, what is more whose sintered holes are sealed by triiron tetroxide. Fe-Mo-alloy powder is dispersed in the ground as a Fe-Mo alloyed grain of high hardness after being sintered, thereby remarkably improving the abrasion resistance and scuffing resistance of the roller.



Description of corresponding document: **US4904302**

BACKGROUND OF THE INVENTION

The present invention relates to a roller formed of a sintered alloy having high wear resistance and assembled in a rotary compressor having high fluid tightness.

In a recent trend, a rotary comprressor for use with domestic electrifications becomes light in weight

more compact in size. Further, for the reduction of production cost and for high performance of the compressor, improvements have been made on materials of respective mechanical components of th compressor.

A rotary compressor mainly includes, as shown in FIGS. 1 and 2, an outer case 10, a cylindrical hou 11 assembled in the case 10 and formed with a vane groove 11A extending in radial direction of the housing, a roller 13 rotatable eccentrically in the housing 11, a shaft 14 integrally fixed to the roller its rotation, and a vane 12 slidably disposed in a vane groove 11A and moved in radial direction of tl roller 13. A compression spring 15 is disposed in the groove 11A to urge the vane 12 radially inwarc Therefore, a radially inner end face of the vane 12 is in slide contact with an outer peripheral surface roller 13. A working chamber is provided by a space defined between the housing 11 and the roller 1 the vane 12 divides the chamber into intake and discharge chambers. The intake chamber is connect an intake port 16 and the discharge chamber is connected to a discharge port 17. A fluid sucked in th working chamber is compressed and fed out by the eccentric rotation of the roller 13.

Among those components, the vane 12 and roller 13 perform relative sliding motion at high load, an therefore, these components must have high wear resistances. On this standpoint, various materials, example, sintered alloy, have been proposed for the materials of the vane and roller.

However, regarding the material of the vane, SKH51 has been still a major material in an actual production. SKH 51 is defined by JIS (Japanese Industrial Standard), which is a high-speed tool stee containing 0.80 to 0.90% of C, 3.80 to 4.50% of Cr, 4.50 to 5.50% of Mo, 5.50 to 6.70% of W, 1.60 2.20% of V and balance Fe.

Further, regarding the material of the roller, a sintered material has been employed as described abo rather than a cast iron. According to the proposed sintered material, a hard metal carbide and a metal formed by a steam treatment are dispersed in a matrix. Such sintered alloy is disclosed in Japanese P Application Kokai Nos. 60-73082 and 60-174853.

More specifically, according to the publication No. 60-174853, it discloses a sintered alloy consistin 10% by weight of chromium, 1-5% by weight of graphite and balance iron and impurities. Metal car metal oxide and free graphite are dispersed in the tempered martensitic matrix. The metal oxide is fo at interiors of sintered voids by steam treatment. This metal oxide seals the sintered voids to thereby lubrication oil retainability.

According to the publication No. 60-73082, it discloses a rotary compressor. A rotor and/or a vane a formed of ferrous sintered alloy. Metal carbide and metal oxide are formed during tempering and are dispersed in the tempered martensitic matrix. Further, nitrogen is solid-solved in the martensitic mat

The above sintered material for the roller is intended to improve wear resistance and fluid-tightness. metal oxide which seals sintered pores serves to enhance fluid-tightness of the compressor. Howevei the use of such sintered material, a compressor roller has been burdened with much higher load beca the recent use of an inverter system. Accordingly, such sintered material may be worn out and under scuffing if applied in the inverter system. In order to overcome this problem, there is a further demai further improvement on wear resistivity and scuffing by using specific composition instead of conve metal carbide dispersed in the matrix.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to prevent a roller for a compressor from being worn ou scuffing under a high load and to improve fluid-tightness of the compressor.

Another object of this invention is to provide an improved compressor roller capable of being used i: inverter system which provides extremely high load.

To achieve the object, according to this invention, there is provided a compressor roller formed of a sintered alloy consisting essentially of 0.5-2.0T by weight of C, 1.0-5.0% by weight of Cu, 1.2-3.0% weight of Mo and a balance Fe and unavoidable impurities. Further, hard particles of Fe-Mo alloy ar dispersed in a pearlitic or tempering martensitic matrix, and sintered pores of the sintered alloy are s with tri-iron tetroxide.

Further, according to the present invention there is provided a method for producing a roller of a compressor, said roller being formed of a sintered body produced by the steps of;

mixing together 1.0 to 2.0% by weight of graphite powders, 2.5 to 3.0% by weight of pure copper powders, 2.0 to 5.0% by weight of Fe-Mo alloy powders and balance pure iron powders to obtain a p mixture; compacting the powder mixture to form a powder compact; sintering the powder compact t obtain a sintered body formed with sintered pores; and, steam treating said sintered body to seal the sintered pores, a resultant sintered body consisting essentially of 0.5-2.0% by weight of C, 1.0-5.0% weight of Cu, 1.2-3.0% by weight of Mo and a balance Fe and unavoidable impurities, hard particles Fe-Mo alloy being dispersed in pearlitic matrix, and the sintered pores being sealed with tri-iron tetr

If martensitic matrix is intended, after sintering, there is provided the steps of hardening the sintered steam treating the hardened sintered body to seal sintered pores; and, tempering the sintered body, a resultant sintered body consisting essentially of 0.5-2.0% by weight of C, 1.0-5.0% by weight of Cu, 3.0% by weight of Mo and a balance of Fe and unavoidable impurities, hard particles of Fe-Mo alloy dispersed in tempering martensitc matrix, and the sintered pores being sealed with tri-iron tetroxide.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings;

FIG. 1 is a vertical-cross section illustrating a structure of a compressor which employs a roller emb this invention;

FIG. 2 is a perspective view showing the compressor showin in FIG. 1;

FIG. 3 is a schematic view showing a wear-testing manner; and,

FIG. 4 is a microscopic photograph showing a structure of a sintered material for the roller of this invention.

DETAILED DESCRIPTION OF THE INVENTION

A roller of this invention is produced by adding 2.0 to 5.0% of Fe-Mo alloy powders to a mixture of graphite powders, pure copper powders and pure iron powders to obtain a powder mixture, compacti powder mixture to obtain a powder compact, sintering the powder compact to obtain a sintered prod with pearlitic matrix, and then subjecting the sintered product to a steam treatment or subjecting the sintered product to a sequential steps of hardening, steam treatment and tempering in order to provid tempered martensitic matrix.

The pearlitic matrix has inherently high toughness. However, the martensitic matrix has higher hard and increases the wear-resistance of the roller. After the sintering process, Fe-Mo powders are dispe the matrix as hard particles of Fe-Mo alloy to significantly improve the wear-resistance and scuffing resistance of the roller. With the amount of Fe-Mo powders at the time of initial adding process bein than 2.0%, sufficient wear-resistance would not be obtainable. On the other hand, if the addition am Fe-Mo alloy powders is more than 5.0%, resultant alloy has excessively high hardness to attack the opponent sliding members, such as the inner end portion of the vane and side housing plates of the

compressor. Therefore, these opponent members are excessively worn out and further, such excessiv amount of Fe-Mo alloy is disadvantageous in terms of manufacturing cost.

After the sintering, there exist continuous pores or open cells in the sintered product. Such open cell: degrade fluid-tightness of the compressor. Therefore, these sintered pores are sealed with tri-iron tet (Fe3 O4). This seal also contributes to the improvement of wear-resistance.

The following will describe the reasons for the percentagewise limitations on the respective compos:

Carbon C will harden the matrix when solid-solved in the matrix. With this component being less th: by weight, generation of pearlite and martensite is insufficient, to thereby reduce strength of the mat When carbon amount is more than 2.0% by weight, excessive amount of cementrite is generated in t matrix, thus render the resultant alloy brittle.

Copper will harden and stabilize the matrix. This effect is not prominent with the component being l than 1.0% by weight. On the other hand, further improved effect may not be obtainable when the component exceeds 5.0% by weight, so that such excessive amount of copper is economically disadvantageous, and further, segregation occurs to thereby lower dimensional accuracy of the final product.

The amount of the molybdenum is within a range of 1.2 to 3.0% by weight in the final sintered prod adding 2.0 to 5.0% of Fe-Mo alloy powders in the powder mixture. The Fe-Mo alloy powders have f and coarse particles. Upon the fine particles being solid solved in the matrix, quenching characteristi be improved and temper embrittlement can be prevented. On the other hand, the coarse particles are dispersed as hard particles of Fe-Mo alloy in the matrix to improve the wear-resistance and scuffing- resistance. These effects are insufficient when the addition amount of the Fe-Mo powders is less thar 2.0%. And, if the addition amount is more than 5.0%, the above mentioned opponent sliding membe be attacked by the sintered material and are worn out, which in turn is disadvantageous in cost.

A description will now be given with regard to results of performance tests according to the present invention.

[Method For Producing Specimens]

The powder mixtures indicated by No. 1-11 in Table 1 were prepared as raw materials of the roller. I Table 1, Nos. 1 through 5 belong to the present invention, and Nos. 6 thru 11 are comparative materi Each of the powder mixtures was compacted at a pressure of 5-6 tons/cm@2 into a solid cylindrical having a diameter of 40 mm and an axial length of 10 mm. Then each of the powder compacts was subjected to various treatments shown in Table 2 where (steam) represents steam treatment; (heat) ir hardening and tempering, and (heat+steam) implies a combination of hardening, tempering and stear treatment. As a result, specimens were obtained which have the compositions, structures and hardne: shown in Table 2.
<tb> TABLE 1
<tb>______________________________________
<tb>Specimen No.
<tb> Powder Mixture
<tb>______________________________________
<tb>1-5 Graphite Powder: 1.0-2.0%
<tb> Pure Copper Powder:
<tb> 2.5-3.0%
<tb> Fe--Mo Alloy Powder:
<tb> 3.0-4.0%
<tb> Zinc Stearic Acid:
<tb> 1.0%
<tb> Pure Iron Powder: Balance

<tb>6 & 7 Graphite Powder: 0.6-0.8%
<tb> Pure Copper Powder:
<tb> 0.5-2.0%
<tb> Fe--Mo Alloy Powder:
<tb> not more than 1.0%
<tb> Zinc Stearic Acid:
<tb> 1.0%
<tb> Pure Iron Powder: Balance
<tb>8 & 9 Graphite Powder: 1.3%
<tb> Ni Powder: 1.0%
<tb> Mo Powder: 1.3%
<tb> Zinc Stearic Acid:
<tb> 1.0%
<tb> Cr(1%)--Fe Alloy Powder:
<tb> Balance
<tb>10 & 11 Graphite Powder: 1.35%
<tb> Pure Copper Powder:
<tb> 3.0%
<tb> Zinc Stearic Acid:
<tb> 1.0%
<tb> Pure Iron Powder: Balance
<tb>____

As speciment No. 12 (compared material), prepared was FC 30 which is a gray cast iron consisting c 3.1%, Si: 2.3%, Mn: 0.7%, P: 0.11%, S: 0.04%, Cu: 0.3%, Cr: 0.2%, Fe: balance, and which is conventionally widely available as a roller material. The cast iron was of solid cyindrical shape havi diameter of 40 mm and a length of 10 mm and was subjected to hardening at a temperature of about DEG C.

[Test Conditions]

The above specimens were subjected to wear test according to Amsler's basic method. Each of the columnar specimens No. 1-12 (corresponding to a roller) serving as a rotating part was assembled in plane contact slide wear testing machine, and a SKH 51 plate (corresponding to a vane) having the s 8 mm.times.7 mm.times.5 mm was also assembled in the machine for serving as a stationary part. A shown in FIG. 3, the stationary part 112 was in pressure contact with an outer peripheral surface of t specimen 113, and the latter was rotated at high speed about its axis for slide contact with the station part while supplying a lubricant L to the slide-contact section.

Condition details were as follows:

Load: 100 Kg

Peripheral Velocity: 1 m/sec.

Lubricant: freezing machine oil (equivallent to ISO 56)

Oil Temperature: 75 DEG C.

Sliding Period: 20 hours.

Under the above conditions, the amount of wearing of the fixed part 112 and rotating part 113 were measured. The test results were shown in Table 2.

Further, scuffing test was also conducted according to the Amsler's wear test. The specimens involv

this test were the same as those involved in the above wear test. While rotating the rotating pieces N at the peripheral velocity of 1.13 m/sec., load of 10 kg was initially applied to the fixed part 112, anc the load was added by 20 kg at every 2 minutes until the load reaches 50 Kg, and thereafter, added b kg at every 2 minutes. The loads at which scuffing occurred were regarded as the maximum limit pr to scuffing which is also shown in Table 2.

Claims of corresponding document: **US4904302**

What is claimed is:

1. A roller for use in a rotary compressor, which roller comprising a sintered body consisting essenti 0.5-2.0% by weight of C, 1.0-5.0% by weight of Cu, 1.2-3.0% by weight of Mo and a balance of Fe unavoidable impurities; and wherein hard particles of Fe-Mo alloy are dispersed in one of pearlitic a tempering martensitic matrix, and sintered pores of said sintered body are sealed with tri-iron tetroxi

2. A method for producing a roller for use in a rotary compressor, said roller being formed of a sinte body produced by the steps of: mixing together 1.0 to 2.0% by weight of graphite powders, 2.5 to 3. weight of pure copper powders, 2.0 to 5.0% by weight of Fe-Mo alloy powders and balance pure iro powders to obtain a powder mixture: compacting said powder mixture to form a powder compact; si said powder compact to obtain a sintered body formed with sintered pores; and, steam treating said sintered body to seal said sintered pores, a resultant sintered body consisting essentially of 0.5-2.0% weight of C, 1.0-5.0% by weight of Cu, 1.2-3.0% by weight of Mo and a balance Fe and unavoidabl impurities, hard particles of Fe-Mo alloy being dispersed in pearlitic matrix, and said sintered pores sealed with tri-iron tetroxide.

3. A method for producing a roller for use in a rotary compressor, said roller being formed of a sinte body produced by the steps of: mixing together 1.0 to 2.0% by weight of graphite powders, 2.5 to 3. weight of pure copper powders, 2.0 to 5.0% by weight of Fe-Mo alloy powders and balance pure iro powders to obtain a powder mixture; compacting said powder mixture to form a powder compact; si said powder compact to obtain a sintered body formed with sintered pores; hardening said sintered b steam treating said hardened sintered body to seal said sintered pores; and, tempering said sintered b resultant sintered body consisting essentially of 0.5-2.0% by weight of C, 1.0-5.0% by weight of Cu, 3.0% by weight of Mo and a balance of Fe and unavoidable impurities, hard particles of Fe-Mo alloy dispersed in tempering martensitic matrix, and said sintered pores being sealed with tri-iron tetroxid

⑲ 日本国特許庁（JP）　　⑪ 特許出願公開

⑫ 公開特許公報（A）　平1－134092

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18/356		D－6682－3H	

審査請求 未請求 発明の数 1 （全4頁）

㊹発明の名称　コンプレッサ用ローラ

㉑特　願　昭62－291746

㉒出　願　昭62(1987)11月20日

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明　細　書

1．発明の名称

コンプレッサ用ローラ

2．特許請求の範囲

成分組成が重量%で、C：0.5 ～2.0 %、Cu：1.0 ～5.0 %、Mo：1.2 ～3.0 %、残部Feと不可避不純物からなり、パーライト又は焼戻しマルテンサイト基地中にFe－Mo合金硬質粒子が分散し、かつ焼結空孔が四三酸化鉄によって封孔された焼結合金からなるコンプレッサ用ローラ。

3．発明の詳細な説明

［産業上の利用分野］

本発明は耐摩耗性と気密性の高い焼結合金を用いたコンプレッサ用のローラに関する。

［従来の技術］

現在、家庭用電気製品で使用するロータリーコンプレッサは軽量、小型化するとともに、低コスト化、高性能化の要求から各部品を形成する材料においても改良が求められている。すなわち、ロータリーコンプレッサは第1図に示すように、ケース10、ハウジング11、ハウジングの溝に収容されるベーン12、ローラ13等から構成されてローラ13が偏心回転することによって作動室に吸入した流体を圧送するが、これらの中でも特に高負荷を受けて互いに摺動するために耐摩耗性が要求されているのがベーン12とローラ13である。

従って両者共に改良された材料が提案されつつあり、特に焼結材料による提案が多くなされているがベーンについては製品としては未だにSKH51材が主流となっている。

一方、ローラ材としては鋳鉄材に代わって基地中に硬質の金属炭化物と水蒸気処理による金属酸化物を分散させた焼結材が特開昭60-73082号や特開昭60-174853 号などにより提案されている。

［発明が解決しようとする問題点］

上述のローラ用焼結材は耐摩耗性と気密性の向上を狙いとしたものであり、焼結空孔を埋めた金属酸化物はコンプレッサの気密性の向上のために不可欠であるが、近年インバータ方式の採用によってよりいっそうの高負荷を受けるようになった

コンプレッサ用ローラはかかる焼結材を用いても摩耗とスカッフィングが生じ、これらを防ぐためには分散された金属炭化物に代わる手段を講ずることが求められている。

[問題点を解決するための手段]

そこで本発明の目的は、高負荷時におけるコンプレッサ用ローラの摩耗とスカッフィングを防止し、またコンプレッサの気密性をも高めることであって、本発明によれば、成分組成が重量%で、C：0.5～2.0％、Cu：1.0～5.0％、Mo：1.2～3.0％、残部Feと不可避不純物からなり、パーライト又は焼戻しマルテンサイト基地中にFe－Mo合金硬質粒子が分散し、かつ焼結空孔が四三酸化鉄によって封孔された焼結合金からなるコンプレッサ用ローラが提供される。

[作用]

本発明のローラは、黒鉛粉、純銅粉、純鉄粉にFe－Mo合金粉末を2.0～5.0％加えてプレスした後、焼結し、パーライト基地とする場合は焼結後に水蒸気処理を行ない、また焼戻しマルテンサイト基地とする場合は焼結後に焼入れ、水蒸気処理、焼戻しの工程を順に行なって製造する。

パーライト基地は強靱であるが、マルテンサイト基地はさらに硬度が高くなって耐摩耗性が増す。Fe－Mo合金粉末は焼結後、高硬度のFe－Mo合金硬質粒子として基地中に分散してローラの耐摩耗性、耐スカッフィング性を著しく高くする。配合時のFe－Mo粉末を2.0％未満とすれば耐摩耗性の効果が少なくなり、また5.0％を超えると相手攻撃性を増すばかりでなく経済的に高コストとなる。焼結後には連続空孔が存在してコンプレッサの気密性が損なわれるので水蒸気処理による四三酸化鉄（Fe_3O_4）で封孔するが、これは耐摩耗性の向上にも寄与する。

以下に成分組成の限定理由を説明する。

C成分は基地に固溶してこれを強化する。0.5％未満ではパーライト、マルテンサイトの生成が不十分となって強度が低下し、2.0％を超えると基地中のセメンタイト量が過多となって脆化する。

Cu成分は基地を強化、安定化させる。1.0％未満ではこの効果が少なく、5.0％を超えると効果が飽和し、かえって経済的に不利となるのみならず偏析が起きて製品の寸法精度を低下させる。

Mo成分はFe－Mo合金粉末の形で2.0～5.0％添加することによってMoの量が1.2～3.0％となるが、粉末の微粒は基地に固溶して焼入性を向上させるとともに焼戻し脆化を防止する一方、粗粉はFe－Mo合金硬質粒子として基地中に分散して耐摩耗性、耐スカッフィング性を高める。Fe-Mo粉末が2.0％未満ではこれらの効果が不十分で、5.0％を超えると相手攻撃性を増すばかりでなくかえって経済的に不利となる。

[実施例]

以下、本発明材の性能確認試験結果を説明する。

（供試材製造方法）

第1表に示すNo.1～11（1～5：本発明材、6～11：比較材）の混合粉を5～6ton／cm^2のプレス面圧で40mmφ×10mmの円柱形状に加圧成形し、第2表に示す処理（表において（水）は水蒸気処理、（焼）は焼入れ、焼戻し、（焼＋水）は焼入れ、焼戻し、水蒸気処理の組合せを各々示す）を行なった結果、第2表に示す組成、組織、硬度を有する試料が得られた。

第1表

試料No.	混合粉の内容
1～5	黒鉛粉1.0～2.0％、純銅粉2.5～3.0％、Fe－Mo合金粉3.0～4.0％、ステアリン酸亜鉛1.0％、残り純鉄粉
6、7	黒鉛粉0.6～0.8％、純銅粉0.5～2.0％、Fe－Mo合金粉1.0以下、ステアリン酸亜鉛1.0％、残り純鉄粉
8、9	黒鉛粉1.3％、Ni粉1.0％、Mo粉1.3％、ステアリン酸亜鉛1.0％、残りCr(1%)-Fe合金粉
10、11	黒鉛粉1.35％、純銅粉3.0％、ステアリン酸亜鉛1.0％、残り純鉄粉

またNo.12（比較材）の試料としてローラ材として最も普及しているFC30材（C：3.2％、Si：2.3％、Mn：0.7％、P：0.11％、S：0.04％、Cu：0.3％、Cr：0.2％、Fe：残）を40mmφ×10mmの円柱形状に加工し、約870℃で焼入れをした。

（試験方法）

以上の供試材についてアムスラー式基礎摩耗試験を行なった。No.1～12の円柱形状の供試材（ローラ相当）を平面接触滑り摩耗試験機における回転片とし、これらに対して8mm×7mm×5mmの平板状に加工したSKH51材（ベーン相当）を固定片として圧接し、その圧接面に潤滑油を供給しつつ回転片を高速回転させた。

試験条件は以下の通りである。

荷重…100Kg、周速…1m／s、潤滑油…スニソ4GD1D、油温…75℃、試験時間…20時間。以上の方法により固定片と回転片の摩耗量を測定し、第2表に示す測定値が得られた。

また同じくアムスラー式摩耗試験によりスカッフィング試験を行なった。試料は上記摩耗試験と

第2表

試料	No.	組成(wt.%) C	Cu	Mo	Ni	Cr	Fe	処理方法	組織	硬度	摩耗量(μ) 固定片	回転片	スカッフ限界荷重(Kg)
本発明材	1	0.92	2.98	1.78	−	−	残	（水）	パーライト中にFe−Mo、Fe_3O_4が分散	HRB 94	4.1	0.8	130
	2	0.92	2.98	1.78	−	−	〃	（焼＋水）	マルテンサイト中にFe−Mo、Fe_3O_4が分散	HRC 30	3.2	0.9	140
	3	1.22	2.95	1.81	−	−	〃	（焼＋水）	マルテンサイト中にFe−Mo、Fe_3O_4が分散	HRC 33	4.2	0.8	130
	4	1.53	2.92	2.40	−	−	〃	（水）	パーライト中にFe−Mo、Fe_3O_4が分散	HRC 24	4.0	0.9	150
	5	1.53	2.92	2.40	−	−	〃	（焼＋水）	マルテンサイト中にFe−Mo、Fe_3O_4が分散	HRC 40	2.5	0.7	150
比較材	6	0.6	0.5	0.6	−	−	残	（焼＋水）	マルテンサイト中にFe_3O_4が分散	HRC 25	スカッフィング		50
	7	0.8	2.0	0.6	−	−	〃	（焼＋水）	マルテンサイト中にFe−Mo、Fe_3O_4が分散	HRC 27	スカッフィング		70
	8	1.02	−	1.34	1.04	0.98	〃	（焼）	マルテンサイト中にFe_3Cが分散	HRC 36	5.9	1.6	110
	9	1.02	−	1.34	1.04	0.98	〃	（焼＋水）	マルテンサイト中にFe_3C、Fe_3O_4が分散	HRC 40	5.8	1.2	110
	10	1.16	3.05	−	−	−	〃	（水）	パーライト中にFe_3O_4が分散	HRB 95	4.8	1.7	90
	11	1.16	3.05	−	−	−	〃	（焼＋水）	マルテンサイト中にFe_3O_4が分散	HRC 31	スカッフィング		80
	12	FC30							ねずみ鋳鉄組織	HRC 49	5.0	2.6	90

同一であり、No.1～12の回転片を周速1.13m／sで回転させながら固定片の圧接荷重をスタート時10Kgとして2分毎に20Kgずつ荷重し、50Kg以上からは10Kgずつ荷重し、これによってスカッフィングが発生した荷重をスカッフィング限界荷重として第2表に示す測定値が得られた。

(試験結果)

第2表に示す測定結果からわかるように、本発明のローラを用いた場合、ベーン材(固定片)、ローラ材(回転片)ともに比較材を用いた場合に比べて摩耗量が少なく、スカッフィング限界荷重が大きいので耐摩耗性、耐スカッフィング性が優れている。

(組織写真)

第1表におけるNo.1の供試材の顕微鏡組織写真(ナイタール液腐食、200倍)を第2図に示す。パーライト基地1中にFe－Mo合金硬質粒子2と四三酸化鉄3が分散している。

[発明の効果]

上述のように本発明のローラは優れた耐摩耗性、耐スカッフィング性と気密性を有し、特に高負荷のかかるコンプレッサに使用した場合に優れた性能を発揮する。

4．図面の簡単な説明

第1図は本発明のローラを用いるコンプレッサの構造を示す縦断面図である。第2図は本発明ローラに用いる焼結材の顕微鏡金属組織写真である。

図中、12はベーン、13はローラ、1はパーライト基地、2はFe－Mo合金硬質粒子、3は四三酸化鉄である。

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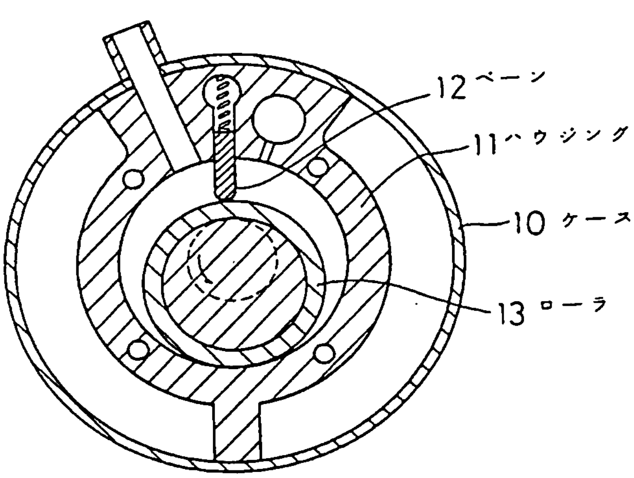
第1図



第2図